Code : 011722

B.Tech 7th Semester Exam., 2019

FOUNDATION ENGINEERING

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer (any *seven*) of the following : 2×7=14

(a) Terzaghi theory of one-dimensional consolidation assumes that

(i) soil is homogeneous and fully saturated

(ii) water and soil particles are incompressible

(iii) deformation of the soil is entirely due to change in volume

(iv) All of the above

(b) The maximum net pressure intensity causing shear failure of soil is known as

(i) safe bearing capacity

(ii) net safe bearing capacity

(iii) net ultimate bearing capacity

(iv) ultimate bearing capacity

(c) Influence factor for immediate settlement of footings depends on its

(i) size and shape

(ii) rigidity alone

(iii) location

(iv) All of the above

(d) For designing end bearing piles of square cross-section in clays having average unconfined compressive strength of 6 t/m^2, the net ultimate bearing capacity may be taken as

(i) 15 t/m^2

(ii) 18 t/m^2

(iii) 20 t/m^2

(iv) 27 t/m^2

(e) A foundation and its machine weigh 981 kN and has a spring constant $k = 10000$ kN/m. What is the value of damping coefficient C_c, if the system is critically damped? (Take $g = 9{\cdot}81$ m/s^2)

(i) 1000 kN-s/m

(ii) 4000 kN-s/m

(iii) 2000 kN-s/m

(iv) 8000 kN-s/m

(f) In underreamed pile construction, the ratio of bulb diameter to shaft diameter is

(i) 1·5

(ii) 2·5

(iii) 2

(iv) 4

(g) Which of the following piles is used for the lateral loads coming on the structure?

(i) Fender pile

(ii) Batter pile

(iii) Compaction pile

(iv) Displacement pile

(h) During a sampling operation, the drive sampler is advanced 600 mm and length of sample recovered is 525 mm. What is the recovery ratio of the sample?

(i) 0·125

(ii) 0·140

(iii) 0·160

(iv) 0·875

(i) A differential free swell test on a soil gives a value of differential free swell of 40%. What is the degree of swelling?

(i) Low

(ii) Medium

(iii) High

(iv) Very high

(j) The diameter of the main cell of a cellular cofferdam is usually kept

(i) 0·5 H

(ii) 0·8 H

(iii) 1·2 H

(iv) 2·0 H

 (Continued)

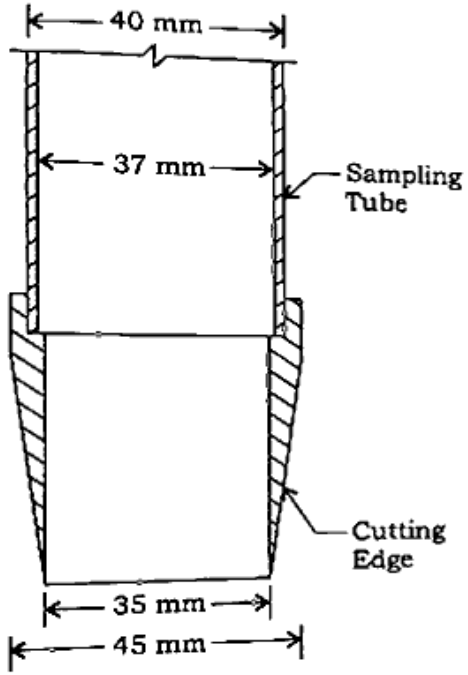
2. (a) A 450-mm wide, square in section concrete pile, 15 m long, is driven in a deep deposit of uniform clay. Laboratory unconfined compression tests on undisturbed samples indicate an average q_u value of 75 kN/m^2. Calculate the ultimate load capacity of pile. 6

(b) A precast concrete pile is driven by a single-acting hammer of weight 15 kN with a free fall of 900 mm. The final set, the average of the last three blows, is 27·5 mm. Estimate the safe load using engineering news record formula (FOS = 6). 4

(c) State the various situations where a pile foundation is more suitable than a shallow foundation. 4

3. (a) Explain the various methods of advancing the boring with neat sketches. 7

(b) Calculate the inside clearance, outside clearance and area ratio for the following sampler : 7



4. (a) The field N value in a deposit of fully submerged fine sand was 40 at a depth of 6 m. The average saturated unit weight of soil is 19 kN/m^3. Calculate the corrected N value, if water table is at a height of 2 m from the ground. 6

(Continued)

(b) The following data was obtained from plate load test carried out on a 60 cm square plate at a depth 2 m below ground surface on a sandy soil which extends up to a large depth. Determine the settlement of a foundation 2 m × 2 m carrying a load of 100t and located at a depth of 2 m from the ground surface : 8

Load intensity (t/m^2)	15	20	25	30	35	40
Settlement (mm)	7·5	11	16·3	23·5	34	45

5. (a) Discuss the situations where a well foundation is more suitable than the other types of foundations. 8

(b) What are the different shapes of well? 6

6. (a) How would you classify expansive soils? Explain in brief. 7

(b) How would you estimate the load carrying capacity of underreamed piles? 7

7. What is a cofferdam? Name the different types of cofferdams and discuss their relative advantages and disadvantages. 14

(Turn Over)

8. (a) What are the different types of machine foundation? Explain them briefly. 7

(b) Resonance occurred at a frequency of 22 cycles per second in a vertical vibration test of a block 1 m × 1 m × 1 m. Determine the coefficient of elastic uniform in compression of the soil given that the weight of the oscillator is 65 kg and the force produced by it at 12 cycles per second is 100 kg. Also compute the amplitude in vertical direction at 12 cycles per second. 7

9. Write short notes on any *four* of the following : 3½×4=14

(a) Forces acting on a well foundation

(b) Underreamed piles

(c) Settlement of pile group

(d) Effect of water table on bearing capacity

(e) Electrical resistivity method

(f) Natural frequency of foundation soil system

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